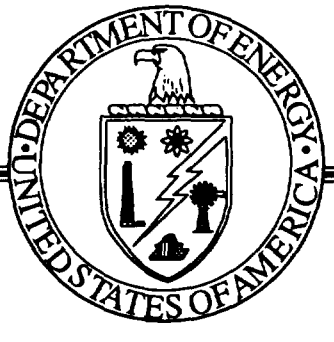
APPENDIX Q

REGULATORY FRAMEWORK AND INDUSTRY INITIATIVES RELATED TO CHEMICAL SAFETY



APPENDIX Q

REGULATORY FRAMEWORK AND INDUSTRY INITIATIVES RELATED TO CHEMICAL SAFETY

I. Environmental Regulations

Resource Conservation and Recovery Act of 1976 (RCRA) and the Hazardous and Solid Waste Amendments of 1984 (HSWA). RCRA and HSWA and their implementing regulations (40 CFR 260 through 40 CFR 280) establish requirements for managing hazardous wastes. Hazardous wastes are defined to include any discarded materials, including chemicals, that are either listed in 40 CFR 261 or exhibit a specific "characteristic," including corrosivity, reactivity, ignitability, or toxicity. Most hazardous chemicals that are either spent or discarded are classified as hazardous wastes. It is the responsibility of the waste generator to determine whether the waste is hazardous, either by applying "process knowledge" or through chemical analysis.

The regulations also require that hazardous materials be managed to minimize their potential for adversely affecting workers, the public, or the environment. 40 CFR 262 through 40 CFR 265 contain a variety of rules designed to ensure that wastes being stored, treated, or disposed of are managed properly. Specific requirements have been developed for a variety of waste categories (e.g., incompatible chemicals, ignitable waste, and "acutely hazardous waste"). Some operating requirements are based on worker safety standards, whereas others focus on emergency planning (contingency plans and emergency preparedness). The regulations also impose rigorous administrative requirements, including reporting waste generations, recording inspections of safety and emergency equipment, and tracking shipping papers (manifests).

40 CFR 280 contains specific regulations for storing chemicals and petroleum products in underground storage tanks (USTs), except where hazardous wastes are involved. These regulations require upgrades for older USTs to prevent and detect leaks and to limit the effects of overfilling. General administrative requirements are also provided.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA). CERCLA and SARA are primarily concerned with cleanup of hazardous materials that have been improperly disposed or spilled. Title III of SARA, known as the Emergency Planning and Community Right-To-Know Act (EPCRA), establishes requirements for chemical reporting and emergency planning. 40 CFR 300 through 40 CFR 372 contain regulations promulgated to implement CERCLA, SARA, and EPCRA.

CERCLA and SARA focus primarily on the identification and cleanup of areas where hazardous materials were improperly disposed. Although these laws and their implementing regulations (40 CFR 300 through 40 CFR 355) are not specific to chemical management, they do establish rigorous notification and cleanup standards for contaminated areas. Reporting requirements relate to actual releases (e.g., spills) of hazardous substances and to identification of facilities where hazardous wastes have been disposed of or where such

release might potentially occur. 10 CFR 302 and 10 CFR 355 identify and provide standards for reporting specific release quantities of hazardous and extremely hazardous substances, respectively.

EPCRA established three major requirements related to (1) emergency planning notification, (2) emergency release notification, and (3) community right-to-know information on chemicals and releases. Many EPCRA requirements for emergency planning and notification were integrated with the CERCLA and SARA regulations (10 CFR 300 through 10 CFR 355). 40 CFR 370 requires submission of material safety data sheets and reports on hazardous chemical inventories (above certain quantities) to the Local Emergency Planning Committee (LEPC). In addition, EPCRA requires that toxic chemical releases be reported, including emissions (i.e., wastes) to the air, water, and land.

The Clean Air Act. The Clean Air Act (CAA) was amended in 1990 to incorporate a number of additional requirements pertaining to the safe management and control of toxic air pollutants. Section 112 of the CAA, the National Emission Standards for Hazardous Air Pollutants (NESHAPs), contains specific criteria for managing chemicals that pose a significant hazard to the community. The CAA requires that the Environmental Protection Agency develop regulations for prevention of and response to accidental or catastrophic releases of hazardous substances. Regulations proposed by EPA on October 20, 1993, should be finalized in 1995. The proposed regulations would require regulated entities to take steps to prevent and mitigate accidental releases.

Title III of the CAA, Hazardous Air Pollutants, identifies and regulates substances that present a threat to human health or the environment. EPA has established emission standards for over 180 toxic chemicals and is specifying maximum achievable control technology (MACT) standards.

Toxic Substances Control Act. Although the Toxic Substances Control Act (TSCA) focuses primarily on the manufacture and processing of toxic chemical substances, it also provides extensive requirements for managing polychlorinated biphenyls (PCBs). 40 CFR 761 imposes requirements for labeling, storage and disposal, spill cleanup, and recordkeeping for equipment and substances containing PCBs.

Federal Water Pollution Control Act (Clean Water Act). The Clean Water Act (CWA) established a number of programs designed to limit discharges of hazardous substances to bodies of water throughout the United States. Hazardous substances are designated in 40 CFR 116. The National Pollutant Discharge Elimination System (NPDES), which derives its authority from the CWA, establishes discharge limits to and from publicly owned treatment works and U.S. waters. Permits issued under the NPDES normally contain effluent limits for hazardous substances, and industrial wastewater discharges to Publically Owned Treatment Works are typically required to comply with limits on discharges of hazardous substances.

Occupational Safety and Health Regulations. Federal standards governing the health and safety of workers are promulgated under the authority of the Occupational Safety and Health Act (OSHA) of 1970, as amended. These standards cover a broad range of activities. OSHA regulations specific to chemical safety are summarized below.

- Compressed Gases. Regulations covering compressed gases (29 CFR 1910.101–105 and 110) address the safe storage, handling, use, and labeling of compressed gases.

- Flammable and Combustible Liquids. Regulations related to flammable and combustible liquids regulations (29 CFR 1910.106) apply to bulk and portable container storage within a facility and its ancillary storage areas. These regulations include (1) design requirements for tanks, storage rooms and buildings, and storage cabinets and (2) information regarding the safe use and handling of these materials, as well as limitations for storage in terms of quantity and location.

- Process Safety Management. The process safety management standard (29 CFR 1910.119) includes requirements for preventing or minimizing the consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals. This regulation applies to chemical processes involving the use of chemicals above established threshold quantities. The standard addresses employee participation, process safety information, hazard analysis, operating procedures, prestartup safety review, mechanical integrity, management of change, training, contractors, emergency planning and response, hot-work permits, incident investigation, compliance audits, and trade secrets. (See Figure Q-1.)

- Hazardous Waste Operations and Emergency Response (HAZWOPER). The HAZWOPER standard (29 CFR 1910.120) covers cleanup operations required by a governmental body, corrective actions involving sites covered by RCRA, voluntary cleanup operations, and operations involving hazardous wastes that are conducted at hazardous waste treatment, storage, and disposal facilities (TSDs). In addition, paragraph (q) of the standard addresses emergency response operations for release of hazardous substances without regard to the location of the hazard. The regulation requires the development of an emergency response plan, training, and medical surveillance for response personnel. The emergency response plan must address evacuation routes and procedures, pre-emergency planning, site security, decontamination, emergency medical treatment, emergency alerting and response procedures, and procedures for critiquing and followup of response efforts.

- Air Contaminants. The air contaminants regulation (29 CFR 1910.1000) identifies permissible exposure limits for a select group of chemicals. Limits are provided in terms of an 8-hour time-weighted average that cannot be exceeded during an 8-hour shift. In addition, some chemicals have short-term exposure and ceiling limits. Where exceedances are noted, the regulation stipulated that employers must attempt engineered and administrative controls before requiring the use of personal protective equipment.

- Chemical Specific Standards. Chemical-specific standards are established for 27 materials, including lead, benzene, and formaldehyde (29 CFR 1910.1001-1050). In addition to identifying permissible exposure limits and action limits, these standards address program requirements, exposure monitoring, medical surveillance, training, labeling, and the safe handling and use of each specific material.

- Asbestos. The asbestos regulation (29 CFR 1926.58) addresses engineered and administrative controls to be followed during construction, repair, alteration, maintenance, removal, or renovation activities involving asbestos-containing materials. In addition, the

standard includes requirements for training, medical surveillance, exposure monitoring, and labeling.

- Hazard Communication. The hazard communication regulation (29 CFR 1910.1200) requires that employees receive information about the hazardous chemicals in their workplace by means of a hazard communication program, chemical labeling, material safety data sheets, and training. In addition, chemical manufacturers and importers are required to assess the hazards of the chemicals they produce.

- Occupational Exposure to Hazardous Chemicals in Laboratories. OSHA's laboratory health and safety regulation (29 CFR 1910.1450) applies to the use of chemicals on a "laboratory scale," rather than chemicals used as part of a production process. The regulation requires that a chemical hygiene plan be established to address standard operating procedures for safety and health, exposure monitoring, engineered controls, personal protective equipment, medical evaluation, and additional protective measures for work with particularly hazardous substances. Laboratory employees must receive training and information on the hazards associated with chemicals used and stored in the laboratory and on the contents of the chemical hygiene plan.

Figure Q-1. Overview of PSM Elements

Process Safety Information	Maintain complete and accurate on the process technology, process equipment, and hazardous characteristics and physical properties of all chemicals and intermediates for all covered processes.
Process Hazard Analysis	Perform Process Hazardous Analyses to identify and assess process hazards for each covered process.
Pre-Startup Safety Review	Establish a procedure and perform pre-start safety reviews for new facilities and for modified facilities when the modification is significant enough to require a change in the process safety information.
Mechanical Integrity	Ensure the integrity and safe operation of process equipment through inspection, testing, preventative maintenance, and quality assurance.
Trade Secrets	Ensure all information is available to support the PSM Rule. When necessary, confidentiality or nondisclosure agreements may be used.
Employee Participation	Ensure that workers are consulted and have access to information regarding all elements of the PSM program.
Subtier Contractor Safety	Ensure that the level of safety is not comprised by subtier contractor operations on or in the vicinity of a process using highly hazardous chemicals.
Training	Establish and implement a training program for all employees involved in operating a covered process. The program must include both initial and refresher training and provide a means of determining successful completion.
Management of Change	Establish and implement written procedures to manage changes (except for "replacements in kind") to process chemicals, technology, equipment, and procedures; and to manage changes to facilities that affect a covered process.
Operating Procedures	Develop and implement written operating procedures that provide clear instructions for safety conducting activities involved in each covered process. Procedures should address operating limits, safety and health considerations, safety systems, and their functions.
Nonroutine Work Authorizations	Ensure that appropriate measures are taken any time nonroutine operations are performed on or near covered process areas that might or promote a release.
Compliance Audits	Ensure that the PSM program is operating in an integrated and effective manner in compliance with PSM requirements.
Emergency Planning Response	Establish and implement an emergency action plan for the entire plant that is in compliance with 29 CFR 1910.38(a) and that also addresses small releases.
Incident Investigation	Establish a written incident investigation procedure that requires a team investigation of any incident which results in, or could reasonably result in, a catastrophic release of highly hazardous chemical. The procedures must require a written report and establish a system to promptly address and resolve any report findings and recommendations.

II. Chemical Manufacturers Association – Responsible Care Program

In addition to Federal requirements governing the safe handling of chemicals and their byproducts and wastes, the Chemical Manufacturers Association, a national trade group representing the major chemical producers, has promulgated a set of voluntary standards governing the handling of chemicals and efforts to protect public health and safety, as well as the environment. The Guiding Principles of Responsible Care are as follows:

- Recognizing and responding to community concerns regarding chemicals and company operations;
- Developing and producing of chemicals that can be manufactured, transported, used, and disposed of safely;
- Making health, safety, and environmental considerations a priority in planning for all existing and new products and processes;
- Reporting promptly to officials, employees, customers, and the public information on chemical-related health or environmental hazards and recommending protective measures;
- Counseling customers on the safe use, transportation, and disposal of chemical products;
- Operating plants and facilities in a manner that protects the environment and the health and safety of employees and the public;
- Extending knowledge by conducting or supporting research on the health, safety, and environmental effects of products, processes, and waste materials;
- Working with others to resolve problems created by past handling and disposal of hazardous substances;
- Participating with Government and others in creating responsible laws, regulations, and standards to safeguard the community, workplace, and the environment; and
- Promoting the principles and practices of Responsible Care by sharing experiences and offering assistance to others who produce, handle, use, transport, or dispose of chemicals.

III. Center for Chemical Process Safety (CCPS) of the American Institute for Chemical Engineers (AIChE)

In 1985, AIChE established CCPS with an overall goal of contributing to the prevention of catastrophic accidents from the manufacture and handling of hazardous chemicals. In accomplishing this goal, CCPS has identified four objectives:

- Establish and publish the latest scientific and engineering practices for prevention and mitigation of incidents involving toxic and/or reactive materials;

- Encourage the use of such information by dissemination through publications, seminars, symposia, and continuing education programs for engineers;

- Advance the state-of-the-art in engineering practices through research in prevention and mitigation of catastrophic events; and

- Develop and encourage the use of undergraduate education curricula which will improve the safety knowledge and consciousness of engineers.

In 1988, CCPS published *Chemical Process Safety Management: A Challenge to Commitment.* This document described a comprehensive model for sound process safety management; the model is comprised of 12 distinct, but interrelated, elements. These elements are as follows: (1) accountability objectives and goals; (2) process knowledge and documentation; (3) capital project review and design procedures; (4) process risk management; (5) management of change; (6) process and equipment integrity; (7) human factors; (8) training and performance; (9) incident investigation; (10) company standards, codes, and regulations; (11) audits and corrective actions; and (12) enhancements to process safety knowledge.

To enhance further understanding and acceptance of these process management safety principles, CCPS conducts a variety of activities and programs, including the following:

- Development of technical guidelines for various aspects of process safety management;

- Sponsorship of national and international conferences and symposia on emerging developments in process safety management;

- Distribution of a directory of chemical process safety services listing organizations offering consulting, emergency, and testing services and training courses; and

- Development of process safety management training course for manufacturing, engineering, and research and development managers.